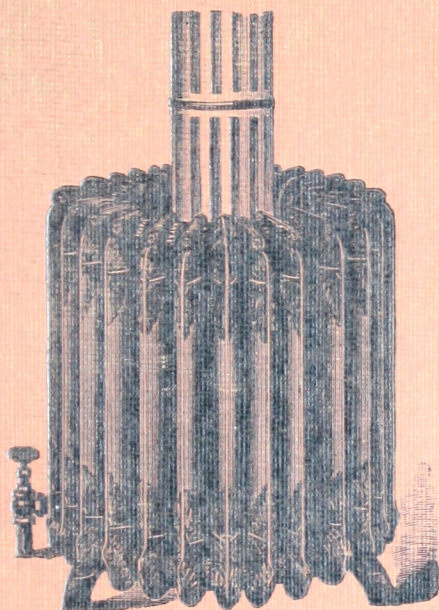


640-5

9 W. W. H. H. H.
Jan. 12, 1909.

Radiators



Philadelphia Hardware and
Malleable Iron Works, Incorporated

11/11/11
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11/11/11
11/11/11

Catalogue, 1905

RADIATORS

EXPOSITION UNIVERSELLE



PARIS, 1900

Philadelphia
Hardware and Malleable Iron Works

INCORPORATED

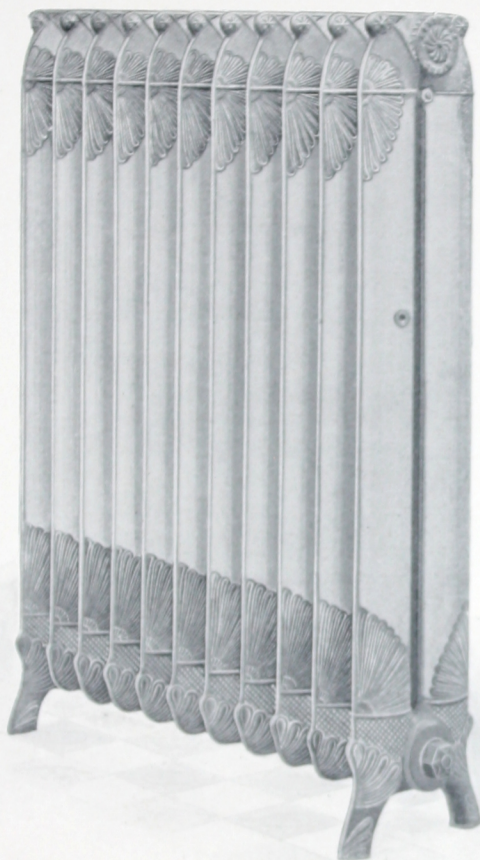
Office, S. E. cor. Ninth and Jefferson Streets
Philadelphia, U. S. A.

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Keystone Radiators

For Steam or Hot Water



Patented November 8, 1892

Perfect Workmanship

Easily Decorated

Keystone Radiators

No. of Loops.	Length Inches.	Open- ings for Single Pipe, Inches.	Two-Pipe Openings		HEATING SURFACE—SQUARE FEET.					
			In- let.	Out- let.	45 Inches High.	38 Inches High.	32 Inches High.	26 Inches High.	23 Inches High.	20 Inches High.
2	5	1	I	X $\frac{3}{4}$	10	8	$6\frac{2}{3}$	$5\frac{1}{3}$	$4\frac{2}{3}$	4
3	$7\frac{1}{2}$	1	I	$\frac{3}{4}$	15	12	10	8	7	6
4	10	1	I	$\frac{3}{4}$	20	16	$13\frac{1}{3}$	$10\frac{2}{3}$	$9\frac{1}{3}$	8
5	$12\frac{1}{2}$	1	I	$\frac{3}{4}$	25	20	$16\frac{2}{3}$	$13\frac{1}{3}$	$11\frac{2}{3}$	10
6	15	$1\frac{1}{4}$	I	$\frac{3}{4}$	30	24	20	16	14	12
7	$17\frac{1}{2}$	$1\frac{1}{4}$	I	$\frac{3}{4}$	35	28	$23\frac{1}{3}$	$18\frac{2}{3}$	$16\frac{1}{3}$	14
8	20	$1\frac{1}{4}$	I	$\frac{3}{4}$	40	32	$26\frac{2}{3}$	$21\frac{1}{3}$	$18\frac{2}{3}$	16
9	$22\frac{1}{2}$	$1\frac{1}{4}$	I	$\frac{3}{4}$	45	36	30	24	21	18
10	25	$1\frac{1}{4}$	I	$\frac{3}{4}$	50	40	$33\frac{1}{3}$	$26\frac{2}{3}$	$23\frac{1}{3}$	20
11	$27\frac{1}{2}$	$1\frac{1}{4}$	I	$\frac{3}{4}$	55	44	$36\frac{2}{3}$	$29\frac{1}{3}$	$25\frac{2}{3}$	22
12	30	$1\frac{1}{4}$	I	$\frac{3}{4}$	60	48	40	32	28	24
13	$32\frac{1}{2}$	$1\frac{1}{4}$	I	$\frac{3}{4}$	65	52	$43\frac{1}{3}$	$34\frac{2}{3}$	$30\frac{1}{3}$	26
14	35	$1\frac{1}{4}$	I	$\frac{3}{4}$	70	56	$46\frac{2}{3}$	$37\frac{1}{3}$	$32\frac{2}{3}$	28
15	$37\frac{1}{2}$	$1\frac{1}{4}$	$1\frac{1}{4}$	I	75	60	50	40	35	30
16	40	$1\frac{1}{4}$	$1\frac{1}{4}$	I	80	64	$53\frac{1}{3}$	$42\frac{2}{3}$	$37\frac{1}{3}$	32
17	$42\frac{1}{2}$	$1\frac{1}{4}$	$1\frac{1}{4}$	I	85	68	$57\frac{2}{3}$	$45\frac{1}{3}$	$39\frac{2}{3}$	34
18	45	$1\frac{1}{4}$	$1\frac{1}{4}$	I	90	72	60	48	42	36
19	$47\frac{1}{2}$	$1\frac{1}{2}$	$1\frac{1}{4}$	I	95	76	$63\frac{1}{3}$	$50\frac{2}{3}$	$44\frac{1}{3}$	38
20	50	$1\frac{1}{2}$	$1\frac{1}{4}$	I	100	80	$66\frac{2}{3}$	$53\frac{1}{3}$	$46\frac{2}{3}$	40
21	$52\frac{1}{2}$	$1\frac{1}{2}$	$1\frac{1}{4}$	I	105	84	70	56	49	42
22	55	$1\frac{1}{2}$	$1\frac{1}{4}$	I	110	88	$73\frac{1}{3}$	$58\frac{2}{3}$	$51\frac{1}{3}$	44
23	$57\frac{1}{2}$	$1\frac{1}{2}$	$1\frac{1}{4}$	I	115	92	$76\frac{2}{3}$	$61\frac{1}{3}$	$53\frac{2}{3}$	46
24	60	$1\frac{1}{2}$	$1\frac{1}{4}$	I	120	96	80	64	56	48
25	$62\frac{1}{2}$	$1\frac{1}{2}$	$1\frac{1}{4}$	I	125	100	$83\frac{1}{3}$	$66\frac{2}{3}$	$58\frac{1}{3}$	50
26	65	$1\frac{1}{2}$	$1\frac{1}{2}$	$1\frac{1}{4}$	130	104	$86\frac{2}{3}$	$69\frac{1}{3}$	$60\frac{2}{3}$	52
27	$67\frac{1}{2}$	$1\frac{1}{2}$	$1\frac{1}{2}$	$1\frac{1}{4}$	135	108	90	72	63	54
28	70	$1\frac{1}{2}$	$1\frac{1}{2}$	$1\frac{1}{4}$	140	112	$93\frac{1}{3}$	$74\frac{2}{3}$	$65\frac{1}{3}$	56
29	$72\frac{1}{2}$	$1\frac{1}{2}$	$1\frac{1}{2}$	$1\frac{1}{4}$	145	116	$96\frac{2}{3}$	$77\frac{1}{3}$	$67\frac{2}{3}$	58
30	75	$1\frac{1}{2}$	$1\frac{1}{2}$	$1\frac{1}{4}$	150	120	100	80	70	60
31	$77\frac{1}{2}$	$1\frac{1}{2}$	$1\frac{1}{2}$	$1\frac{1}{4}$	155	124	$103\frac{1}{3}$	$82\frac{2}{3}$	$72\frac{1}{3}$	62
32	80	$1\frac{1}{2}$	$1\frac{1}{2}$	$1\frac{1}{4}$	160	128	$106\frac{2}{3}$	$85\frac{1}{3}$	$74\frac{2}{3}$	64

If heating surface is desired in square meters, make 10.75 square feet = 1 square meter. (See Table, p. 14.)

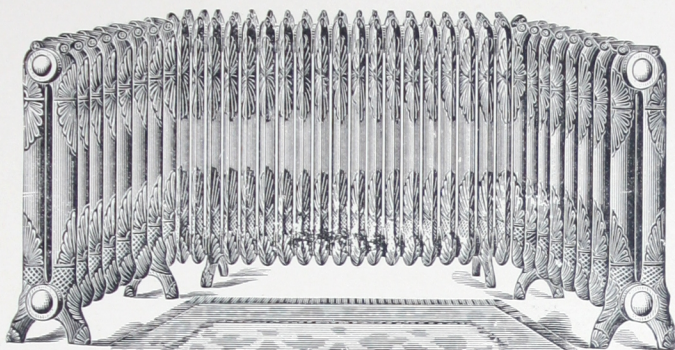
Width of loop, $7\frac{1}{4}$ inches.

Width across feet, $9\frac{1}{4}$ inches.

The above Table of Heating Surfaces is for the number of Loops shown in first column.

Height from floor to centre of opening for inlets, $4\frac{1}{4}$ inches; but all steam Radiator outlets are tapped at extreme lowest point of circulation, so that distance of centre of hole from floor will vary according to size of tapping. Hot water the same for both inlets and outlets.

When not ordered otherwise, Radiators will be tapped as above for steam; for hot water, same size outlet as flow. If openings varying from the above are required, they will be provided without extra charge.

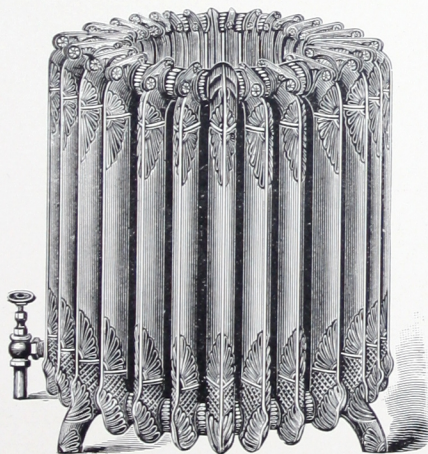


Special Forms

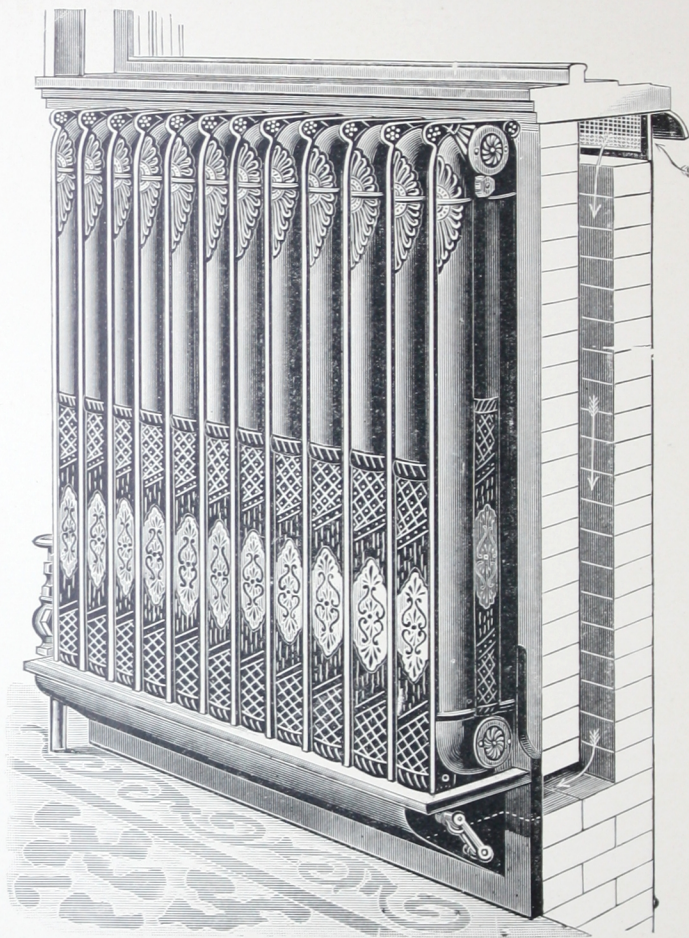
Circular, Column, Stairway and Window Radiators
furnished in all heights.

Groups of sections curved to any radius or adjusted
to any angle.

FOR ALL SPECIAL FORMS, SPECIAL PRICES



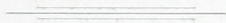
Keystone, Direct-Indirect



The Keystone Direct-Indirect Radiator furnished in four sizes, as follows :—

HEIGHT FROM FLOOR INCLUDING BASE	HEATING SURFACE PER LOOP
26 $\frac{3}{4}$ in.	2 $\frac{1}{3}$ feet
30 $\frac{1}{4}$ “	2 $\frac{2}{3}$ “
36 $\frac{1}{4}$ “	3 $\frac{1}{3}$ “
42 $\frac{1}{4}$ “	4 “

Thickness of loop at joint, 2 $\frac{3}{4}$ inches ; width, 7 $\frac{1}{4}$ inches.



Advantages of the Keystone Direct-Indirect Radiator

Clear, open space at floor under the base, giving plenty of room to sweep out freely.

No ribs or projections inside the damper space to make traps to accumulate dust.

Space under Radiator at floor in plain sight for inspection.

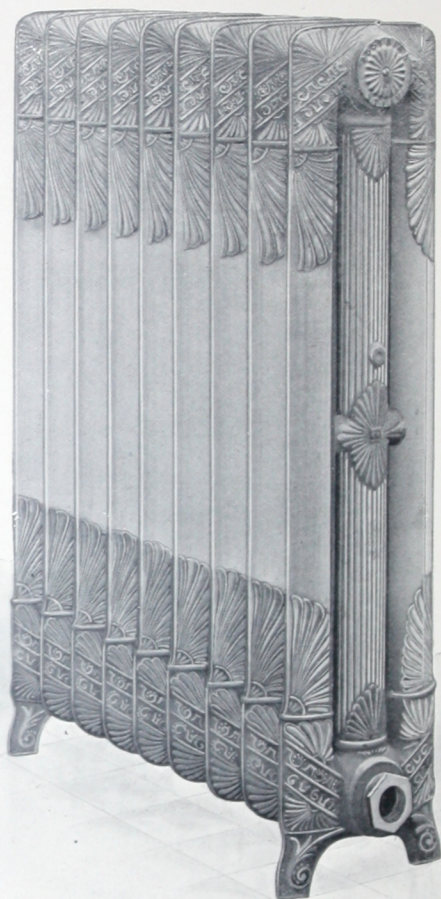
No complicated mechanism in the damper. Construction simple. Opens and shuts like a door handle. No guess work as to whether damper is open or shut.

Draft from outer air to Radiator absolutely direct.

By reason of the clear space underneath and the free circulation the Radiator is specially adapted for Hospitals, Schools, etc., where sanitary considerations are important.

Pure air and cleanliness absolutely attained by our Radiator, besides a maximum of heating capacity.

Assyrian, Three Column—Direct



Assyrian, Three Column—Direct

Number of Loops.	Length, Inches.	HEATING SURFACE—SQUARE FEET.					
		Height 45½ in.	Height 38½ in.	Height 32½ in.	Height 26½ in.	Height 23½ in.	Height 20½ in.
2	6	14	12	10	8	7	6
3	9	21	18	15	12	10½	9
4	12	28	24	20	16	14	12
5	15	35	30	25	20	17½	15
6	18	42	36	30	24	21	18
7	21	49	42	35	28	24½	21
8	24	56	48	40	32	28	24
9	27	63	54	45	36	31½	27
10	30	70	60	50	40	35	30
11	33	77	66	55	44	38½	33
12	36	84	72	60	48	42	36
13	39	91	78	65	52	45½	39
14	42	98	84	70	56	49	42
15	45	105	90	75	60	52½	45
16	48	112	96	80	64	56	48
17	51	119	102	85	68	59½	51
18	54	126	108	90	72	63	54
19	57	133	114	95	76	66½	57
20	60	140	120	100	80	70	60
21	63	147	126	105	84	73½	63
22	66	154	132	110	88	77	66
23	69	161	138	115	92	80½	69
24	72	168	144	120	96	84	72
25	75	175	150	125	100	87½	75
26	78	182	156	130	104	91	78
27	81	189	162	135	108	94½	81
28	84	196	168	140	112	98	84
29	87	203	174	145	116	101½	87
30	90	210	180	150	120	105	90
31	93	217	186	155	124	108½	93
32	96	224	192	160	128	112	96

Height, 45½ inches ; 7 feet heating surface per loop.

“ 38½ “ 6 “ “ “ “

“ 32½ “ 5 “ “ “ “

“ 26½ “ 4 “ “ “ “

“ 23½ “ 3½ “ “ “ “

“ 20½ “ 3 “ “ “ “

Width of loop, 9 inches.

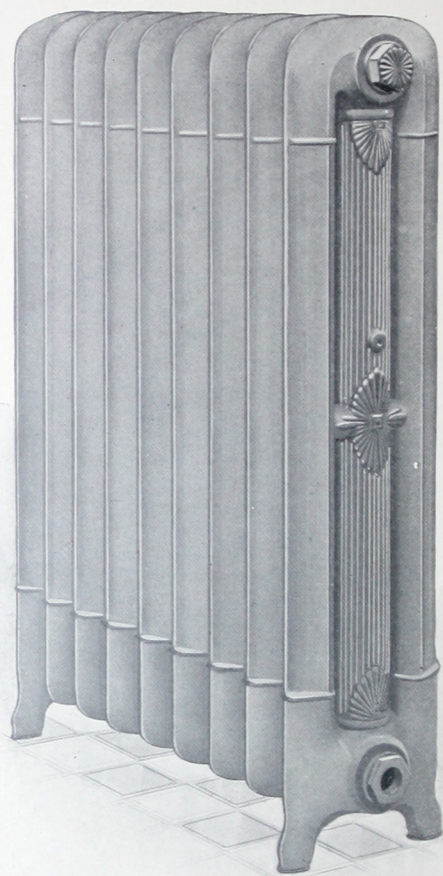
Extreme width across feet, 9½ inches.

Nipples, 2 inches.

Thickness of loop at joint, 3 inches.

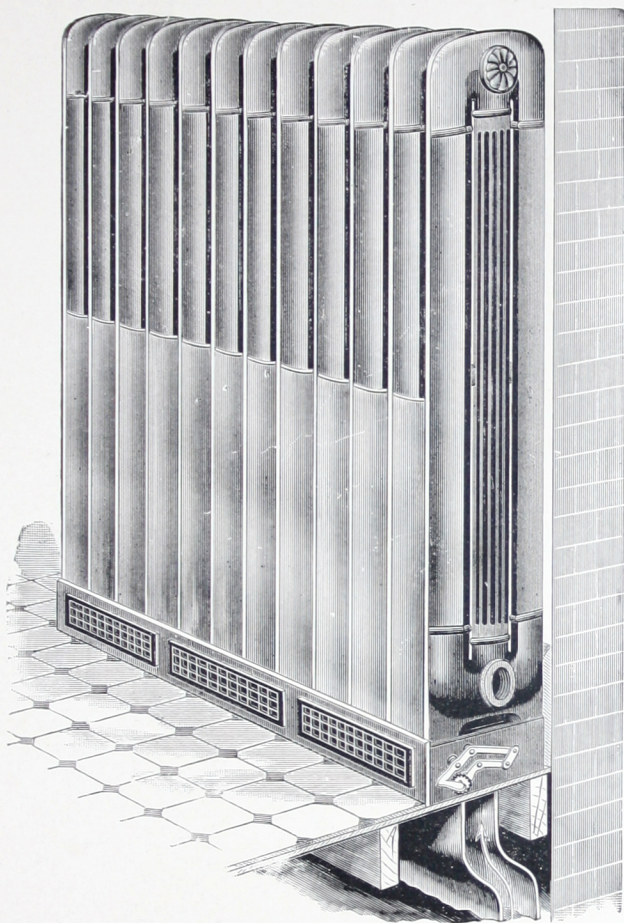
Height to centre of opening, 4 inch for inlets, but steam outlets are tapped at lowest point of circulation—so this height varies. Hot water same at both ends.

Penn, Three Column—Direct



All dimensions same as Assyrian

Penn, Three Column—Direct-Indirect



For Floor Flue or Duct

Front removable, to gain free access for cleaning. Easy foot movement of valve. Simplicity of action. May be set in any position.

IN FOUR HEIGHTS.

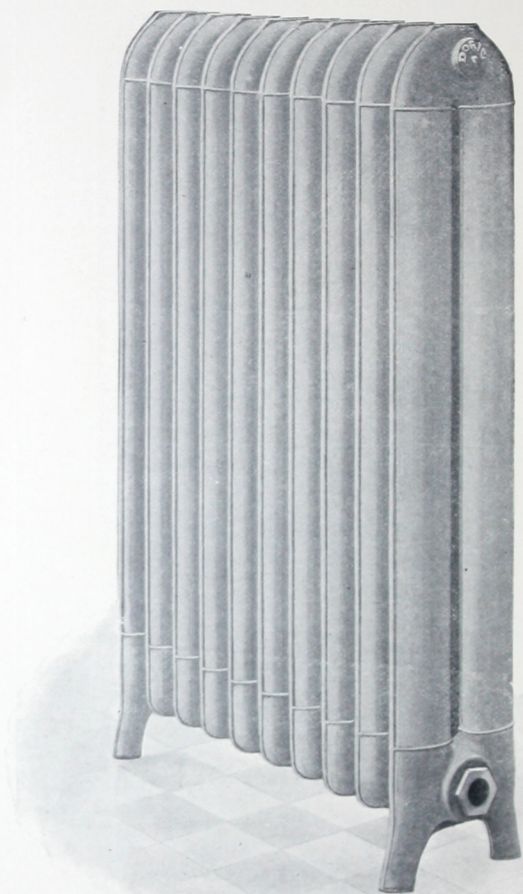
Height of Base from Floor, $3\frac{1}{4}$ inches. Width of Base, $9\frac{1}{2}$ inches.
Thickness of Loop at Joint, $2\frac{1}{4}$ inches.

Total Height from Floor including Base.

40 inches.
34 "
28 "
25 "

Heating Surface.
6 Square Feet.
5 "
4 "
 $3\frac{1}{2}$ "

Doric, Double Column



Doric—Direct, Double Column

No. of Loops.	Length, $2\frac{1}{2}$ inches per Sec.	HEATING SURFACE—SQUARE FEET.					
		$\frac{45}{8}$ Inches High.	$\frac{38}{8}$ Inches High.	$\frac{32}{8}$ Inches High.	$\frac{26}{8}$ Inches High.	$\frac{23}{8}$ Inches High.	$\frac{20}{8}$ Inches High.
2	5	10	8	$6\frac{2}{3}$	$5\frac{1}{3}$	$4\frac{2}{3}$	4
3	$7\frac{1}{2}$	15	12	10	8	7	6
4	10	20	16	$13\frac{1}{3}$	$10\frac{2}{3}$	$9\frac{1}{3}$	8
5	$12\frac{1}{2}$	25	20	$16\frac{2}{3}$	$13\frac{1}{3}$	$11\frac{2}{3}$	10
6	15	30	24	20	16	14	12
7	$17\frac{1}{2}$	35	28	$23\frac{1}{3}$	$18\frac{2}{3}$	$16\frac{1}{3}$	14
8	20	40	32	$26\frac{2}{3}$	$21\frac{1}{3}$	$18\frac{2}{3}$	16
9	$22\frac{1}{2}$	45	36	30	24	21	18
10	25	50	40	$33\frac{1}{3}$	$26\frac{2}{3}$	$23\frac{1}{3}$	20
11	$27\frac{1}{2}$	55	44	$36\frac{2}{3}$	$29\frac{1}{3}$	$25\frac{2}{3}$	22
12	30	60	48	40	32	28	24
13	$32\frac{1}{2}$	65	52	$43\frac{1}{3}$	$34\frac{2}{3}$	$30\frac{1}{3}$	26
14	35	70	56	$46\frac{2}{3}$	$37\frac{1}{3}$	$32\frac{2}{3}$	28
15	$37\frac{1}{2}$	75	60	50	40	35	30
16	40	80	64	$53\frac{1}{3}$	$42\frac{2}{3}$	$37\frac{1}{3}$	32
17	$42\frac{1}{2}$	85	68	$56\frac{2}{3}$	$45\frac{1}{3}$	$39\frac{2}{3}$	34
18	45	90	72	60	48	42	36
19	$47\frac{1}{2}$	95	76	$63\frac{1}{3}$	$50\frac{2}{3}$	$44\frac{1}{3}$	38
20	50	100	80	$66\frac{2}{3}$	$53\frac{1}{3}$	$46\frac{2}{3}$	40
21	$52\frac{1}{2}$	105	84	70	56	49	42
22	55	110	88	$73\frac{1}{3}$	$58\frac{2}{3}$	$51\frac{1}{3}$	44
23	$57\frac{1}{2}$	115	92	$76\frac{2}{3}$	$61\frac{1}{3}$	$53\frac{2}{3}$	46
24	60	120	96	80	64	56	48
25	$62\frac{1}{2}$	125	100	$83\frac{1}{3}$	$66\frac{2}{3}$	$58\frac{1}{3}$	50
26	65	130	104	$86\frac{2}{3}$	$69\frac{1}{3}$	$60\frac{2}{3}$	52
27	$67\frac{1}{2}$	135	108	90	72	63	54
28	70	140	112	$93\frac{1}{3}$	$74\frac{2}{3}$	$65\frac{1}{3}$	56
29	$72\frac{1}{2}$	145	116	$96\frac{2}{3}$	$77\frac{1}{3}$	$67\frac{2}{3}$	58
30	75	150	120	100	80	70	60
31	$77\frac{1}{2}$	155	124	$103\frac{1}{3}$	$82\frac{2}{3}$	$72\frac{1}{3}$	62
32	80	160	128	$106\frac{2}{3}$	$85\frac{1}{3}$	$74\frac{2}{3}$	64

If heating surface is desired in square meters, make 10.75 square feet = 1 square meter.

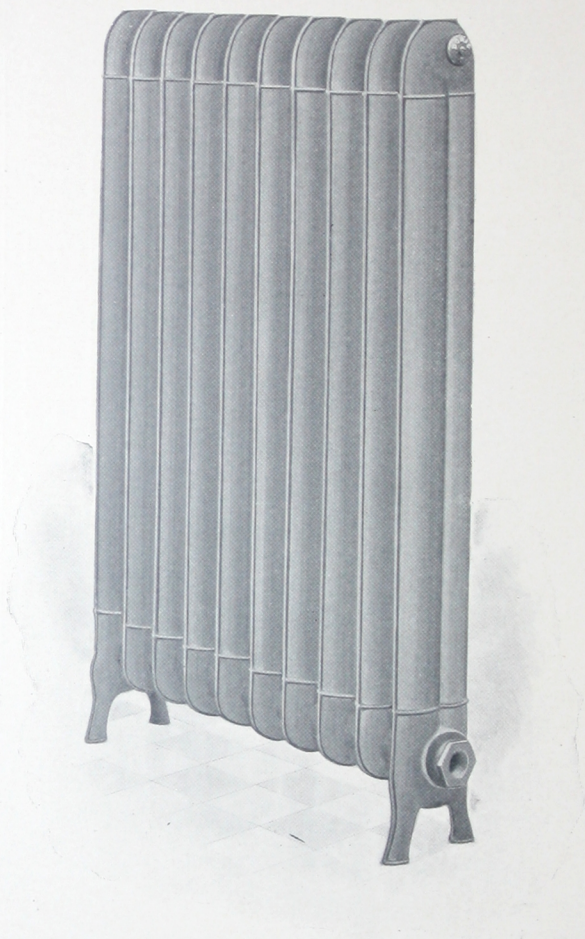
Width across loop, $7\frac{1}{4}$ inches.

Width across feet, 8 inches.

The above Table of Heating Surfaces is for the number of Loops in first column.

Height from floor to centre of opening for inlets, $4\frac{1}{2}$ inches ; but all steam Radiator outlets are tapped at extreme lowest point of circulation, so that distance of centre of hole from floor will vary according to size of tapping. Hot water the same for both inlets and outlets.

Doric, Single Column



Doric—Direct, Single Column

No. of Sections.	Length $2\frac{1}{2}$ in. per Sec.	HEATING SURFACE—SQUARE FEET.				
		38-in. Height. 3 sq. ft. per Sec.	32-in. Height. $2\frac{1}{2}$ sq. ft. per Sec.	26-in. Height. 2 sq. ft. per Sec.	23-in. Height. $1\frac{2}{3}$ sq. ft. per Sec.	20-in. Height. $1\frac{1}{2}$ sq. ft. per Sec.
2	5	6	5	4	$3\frac{1}{3}$	3
3	$7\frac{1}{2}$	9	$7\frac{1}{2}$	6	5	$4\frac{1}{2}$
4	10	12	10	8	$6\frac{2}{3}$	6
5	$12\frac{1}{2}$	15	$12\frac{1}{2}$	10	$8\frac{1}{3}$	$7\frac{1}{2}$
6	15	18	15	12	10	9
7	$17\frac{1}{2}$	21	$17\frac{1}{2}$	14	$11\frac{2}{3}$	$10\frac{1}{2}$
8	20	24	20	16	$13\frac{1}{3}$	12
9	$22\frac{1}{2}$	27	$22\frac{1}{2}$	18	15	$13\frac{1}{2}$
10	25	30	25	20	$16\frac{2}{3}$	15
11	$27\frac{1}{2}$	33	$27\frac{1}{2}$	22	$18\frac{1}{3}$	$16\frac{1}{2}$
12	30	36	30	24	20	18
13	$32\frac{1}{2}$	39	$32\frac{1}{2}$	26	$21\frac{2}{3}$	$19\frac{1}{2}$
14	35	42	35	28	$23\frac{1}{3}$	21
15	$37\frac{1}{2}$	45	$37\frac{1}{2}$	30	25	$22\frac{1}{2}$
16	40	48	40	32	$26\frac{2}{3}$	24
17	$42\frac{1}{2}$	51	$42\frac{1}{2}$	34	$28\frac{1}{3}$	$25\frac{1}{2}$
18	45	54	45	36	30	27
19	$47\frac{1}{2}$	57	$47\frac{1}{2}$	38	$31\frac{2}{3}$	$28\frac{1}{2}$
20	50	60	50	40	$33\frac{1}{3}$	30
21	$52\frac{1}{2}$	63	$52\frac{1}{2}$	42	35	$31\frac{1}{2}$
22	55	66	55	44	$36\frac{2}{3}$	33
23	$57\frac{1}{2}$	69	$57\frac{1}{2}$	46	$38\frac{1}{3}$	$34\frac{1}{2}$
24	60	72	60	48	40	36
25	$62\frac{1}{2}$	75	$62\frac{1}{2}$	50	$41\frac{2}{3}$	$37\frac{1}{2}$
26	65	78	65	52	$43\frac{1}{3}$	39
27	$67\frac{1}{2}$	81	$67\frac{1}{2}$	54	45	$40\frac{1}{2}$
28	70	84	70	56	$46\frac{2}{3}$	42
29	$72\frac{1}{2}$	87	$72\frac{1}{2}$	58	$48\frac{1}{3}$	$43\frac{1}{2}$
30	75	90	75	60	50	45
31	$77\frac{1}{2}$	93	$77\frac{1}{2}$	62	$51\frac{2}{3}$	$46\frac{1}{2}$
32	80	96	80	64	$53\frac{1}{3}$	48

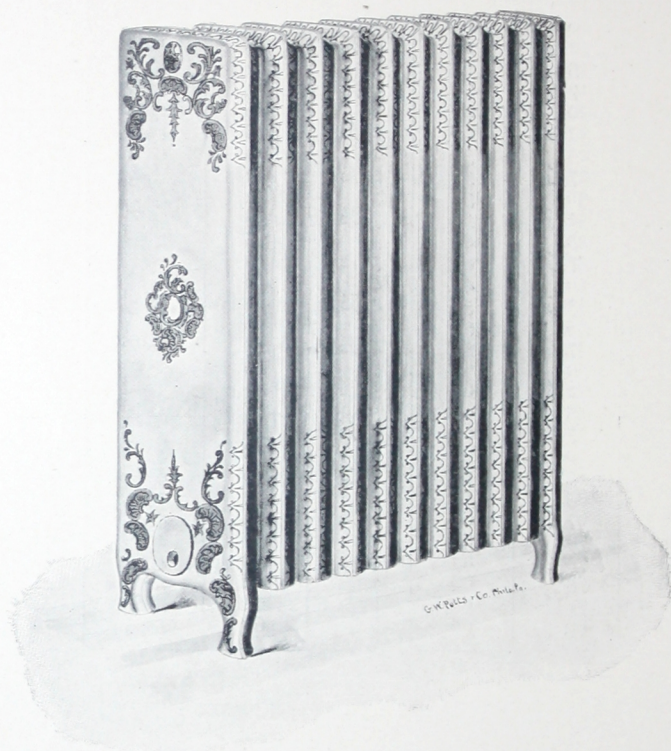
Width across loop, $4\frac{5}{8}$ inches.

Width across leg, $5\frac{3}{4}$ inches.

From floor to centre of inlet, $4\frac{1}{2}$ inches ; but all steam Radiator outlets are tapped at extreme lowest point of circulation, so that distance of centre of hole from floor will vary according to size of tapping. Hot water the same for both inlets and outlets.

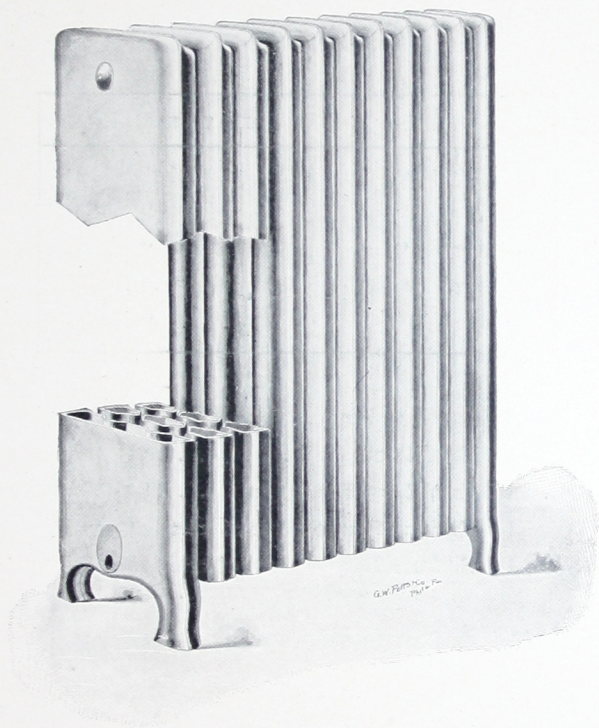
If heating surface is desired in square meters, make 10.75 square feet = 1 square meter.

Hecla, Flue Radiator



Hecla, Flue Radiator

(Sectional View)



Hecla, Flue Radiator

Both Plain and Figured Patterns

HEIGHT	FEET TO EACH LOOP
38 in.	6 $\frac{1}{3}$ ft.
32 "	5 $\frac{1}{3}$ "
26 "	4 $\frac{1}{3}$ "
23 "	3 $\frac{2}{3}$ "
20 "	3 $\frac{1}{3}$ "

Thickness of Loop at Joint 2 $\frac{1}{2}$ in.

Width of Loop 7 $\frac{1}{2}$ "

Width of Loop across feet 8 "

Height from floor to centre of Inlet . 4 $\frac{1}{2}$ "

Height from floor to centre of Inlet
with high leg 6 "

Height from floor to outlet varies, as opening is at extreme lowest point of circulation.

Nipples, 2 in.

Tapping

One Pipe Steam

Radiators containing 24 square feet and under	1	inch
Between 24 and 60 square feet, inclusive	1¼	"
Between 60 and 100 square feet, inclusive	1½	"
Above 100 square feet	2	"

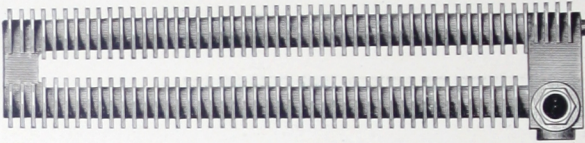
Two Pipe Steam

Radiators containing 48 square feet and under	1	x	¾	inch
Radiators containing between 48 and 96 sq. ft., inclusive	1¼	x	1	"
Radiators containing over 96 square feet	1½	x	1¼	"

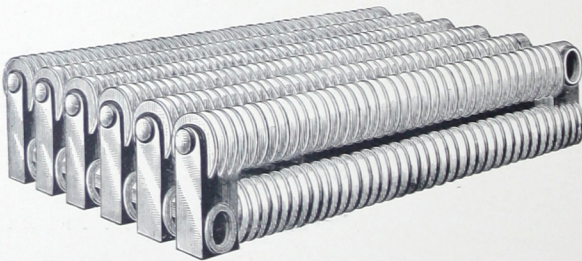
Hot Water

Radiators containing 40 square feet and under	1	x	1	inch
Radiators containing between 40 and 72 sq. ft., inclusive	1¼	x	1¼	"
Radiators containing above 72 square feet	1½	x	1½	"

Alpha—Indirect

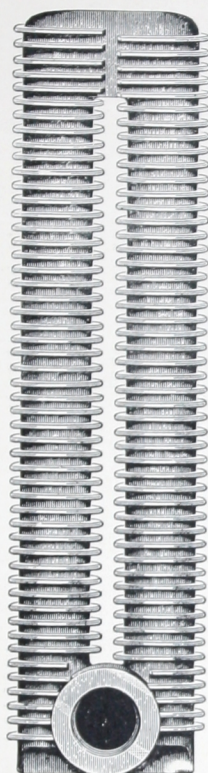


Sq. feet of heating surface in each section . . .	12 feet
Width of section	7 $\frac{3}{4}$ in.
Thickness	2 $\frac{3}{4}$ "
Length	36 "
Size of opening	1 $\frac{1}{2}$ "



Connected with R. and L. Hexagon Nipples.

Aerial—Indirect



Used Upright

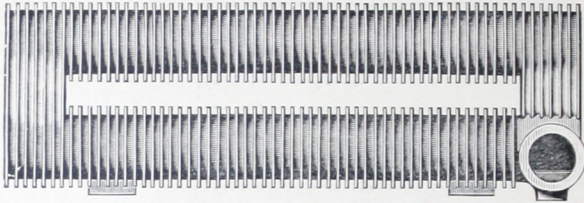
Square feet to each section	15 feet
Distance between sections	1½ inches
Width of section	9 "
Thickness	3¼ "
Height	37 "
Size of opening	3 "

Connected by R. and L. Hexagon Nipples.

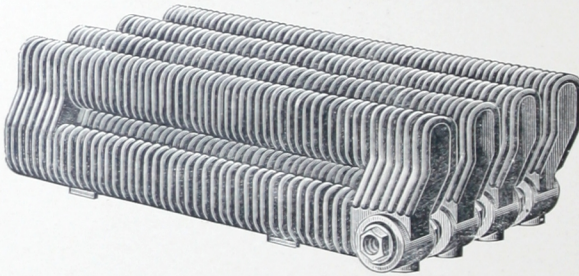
Adapted to Public Buildings where forced draft is used.

Erus—Indirect

For Steam only



Front View



Perspective View

42 $\frac{3}{4}$ inches long, 15 inches wide, 3 $\frac{1}{2}$ inches thick at hub.
About 4 inches from centre to centre when made up. Connected with
3-inch R. and L. Hexagon Nipples.
21 square feet Heating Surface to each section.

Wall Boxes



Outside measurements, 5 x 17½ inches

Inside measurements, 4¼ x 17 inches

Measurements by Metric System

Linear Measure

1 Centimeter	=	.3937 inch
1 Decimeter	=	3.937 "
1 Meter	=	39.37 "

Square Measure

1 Square Centimeter	=	.155 Sq in.
1 " Decimeter	=	15.50 " or .107638 Sq ft.
1 " Meter	=	1550 " or 10.763888 "

FOR HEATING SURFACES, 10.75 Square Feet to the Square Meter is a sufficient approximation.

JOHN H. MILLS'S "Heat for the Warming and Ventilation of Buildings" gives the following Rule for Steam Heating by Radiators :

Allow one square foot of radiating surface for each two feet of glass, one for each 20 square feet of exposed wall and one for each 200 cubic feet of space.

Applying this rule to the elements of a supposed room containing 2400 cubic feet with

Area of glass, 48 sq. ft. 24

" exposed wall, 320 sq. ft. . 16

" cubic ft. of space, 2400 . 12

52 sq. ft. of Radiating surface, or one to every 46 cubic ft. of space.

By Professor Carpenter's calculations 56 sq. ft. of Radiating surface or one to 43 cubic ft. of space.

This result is for Direct radiation by steam, and should be increased for conditions as follows :

Ten per cent. where exposure is a northerly one.

Ten per cent. where building is heated during the day only—the location being not a specially exposed one.

Thirty per cent. where building is heated during day only, and the location is an exposed one.

Fifty per cent. where building is heated intermittingly with intervals of days or week of non-heating.

For hot water heating add about $33\frac{1}{3}$ per cent.

For INDIRECT HEATING, the ratio of heated surface to space to be warmed should be increased 50 per cent. over that of Direct Radiation.

SUMMARY OF APPROXIMATE RULES:

For heating to 70 degrees in zero weather, for DIRECT HEATING, Radiating surface is equal to the sum of the glass surface plus $\frac{1}{4}$ the exposed wall surface plus $\frac{1}{55}$ to $\frac{3}{55}$ * the cubic space, multiplied by 0.25 for low pressure steam, or by 0.40 for hot water.

For INDIRECT HEATING, from zero outside to 70 degrees inside: the surface of the steam radiator being taken at 212°, and of the hot water radiator at 170°:—
—Radiating surface is equal to the glass surface plus one-fourth the exposed wall surface in square feet multiplied by the following factors:

	STEAM	HOT WATER
1st story	0.7	1.05
2d “	0.6	0.9
3d “	0.5	0.8

* $\frac{1}{55}$ for upper floors.

$\frac{2}{55}$ for first floor.

$\frac{3}{55}$ for halls and passages.

CHARACTERISTICS OF STEAM.

Pressure and density of steam which is generated in free contact with water rises with the temperature, and, reciprocally, its temperature rises with the pressure and density, and higher the temperature the more rapid the pressure. There is but one and a corresponding pressure and density for each temperature, and steam generated in free contact with water is both at its maximum density and pressure, for its temperature, and in this condition it is termed *saturated* from its being incapable of vaporizing more water until its temperature is raised. *Saturated* steam is therefore at both its condensing and generating points, that is, it is condensed if its temperature is reduced, and more water is evaporated if its temperature is raised.

If, however, the whole of the water is evaporated, or a volume of saturated steam is isolated from water in any way in a confined space, and an additional quantity of heat is then applied to the steam, its condition of saturation is changed, the steam becomes *super heated*, and both temperature and pressure are increased.

Steam at its boiling point is equal to pressure of atmosphere—14.723 per sq. inch at temperature 60° Fahr.

A cubic inch of water evaporated under ordinary atmospheric pressure is converted into (very nearly) one cubic foot of steam, and it exerts a mechanical force equal to raising 2100 pounds one foot high.

TABLE

Pressure and Temperature, Volume and Density of Saturated Steam.

PRESSURE.		Temperature.	Volume of 1 lb. in Cubic Feet.	Density or Weight of 1 Cubic Foot. Lbs.
Per Sq. inch.	Inches of Mercury Supported.			
14.7	29.92	212.	26.36	.0380
15.	30.54	213.1	25.85	.0387
20.	40.72	228.	19.72	.0507
25.	50.9	240.1	15.99	.0625
30.	61.8	250.4	13.46	.0743
35.	71.26	259.3	11.65	.085
40.	81.43	267.3	10.27	.0974
45.	91.61	274.4	9.18	.1089
50.	101.8	281.	8.31	.120
55.	111.98	287.1	7.61	.1314
60.	124.16	292.7	7.01	.1425
65.	130.34	298.	6.49	.1538
70.	142.52	302.9	6.07	.1648
75.	152.69	307.5	5.68	.1759
80.	162.87	312.	5.35	.1869
85.	173.05	316.1	5.05	.198
90.	183.23	320.2	4.79	.2089
95.	193.41	324.1	4.55	.2198
100.	203.59	327.9	4.33	.2307
120.	244.31	341.1	3.65	.2738

